

## INVESTIGATION OF MOSQUITO FAUNA (DIPTERA, CULICIDAE) IN POTISJE

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### Abstract

During a four year investigation (1979—1982) of fauna of mosquitoes in the region of Potisje 18 species were recorded. The material was collected on seven localities along the river Tisa and eleven localities which represent river lakes, pools and swamps, all of them being the remnants of the former course of the river. Nine species, of total 18, were found in breeding places along river, and the rest in breeding places of former river course. Six species are mutual for both types of breeding places. With five species that have been recorded during previous researches, it is the total of 23 registered species in the region of Potisje.

### Introduction

Flooded areas along the Tisa as well as the remaining parts of the former course of this river are typical breeding places of mosquitoes. Faunistical researches of the family Culicidae (Diptera) in this area were conducted during a four year period from 1979 to 1982.

The material was collected on seven localities along the Tisa and eleven localities being often in the form of crescent depressions, lakes, pools and swamps and are the remaining parts of the previous river course. Some of these lakes are characterized with a certain percent of salt in water. Fauna of mosquitoes in this area, specially along the river banks, has already been the subject of research. ADAMOVIĆ (1975) examined in detail the subfamily *Anopheline* and recorded four species of genus *Anopheles*. MATILDA MOROVIĆ (1980) registered the presence of species *Aedes cataphylla* DYAR in the vicinity of Novi Kneževac, the one which was not recorded in our researches (Fig. 1).

### Area examined

The river Tisa rises in the Carpathians. When it descends to Pannonia plain it becomes a typical lowland river. On the territory of Yugoslavia, i.e. Vojvodina, it receives small quantity of water, only 9,4% of total quantity that enters in our country. Of 9,4% 6,4% enters from the river Begej and the rest of 3% from all other tributaries.

The bed of the river Tisa is an uniform one without the islets and river branches. Flowing through the plains it has a very small fall of only 28 mm/km. A small

fall of the river causes its meandres and their downstream movements. Slow flowing of the Tisa through these meandres causes high water level and frequent floods. These were the reasons why the course of the Tisa was regulated during the middle of 19<sup>th</sup> century. The length of the river was reduced from 1429 km to 977 km. The parts of the river course that had been cut off retained their crescent forms and turned to pools, lakes and swamps. There are a lot of crescent depressions all over the fields in Vojvodina, specially in Banat and Bačka. During drought years, those that are on saline soil are without water and vegetation and are covered with crystallized soda and various salts which make the water brackish.

The Tisa has two maximums and two minimums. For the appearance of the mosquitoes the first maximum is more interesting. It occurs in April as a result of snow melting in the Carpathians where it starts earlier than in the Alps because of smaller altitudes. The second maximum occurs around November 20th and is of minor interest. These two maximums are separated by period of low waters.

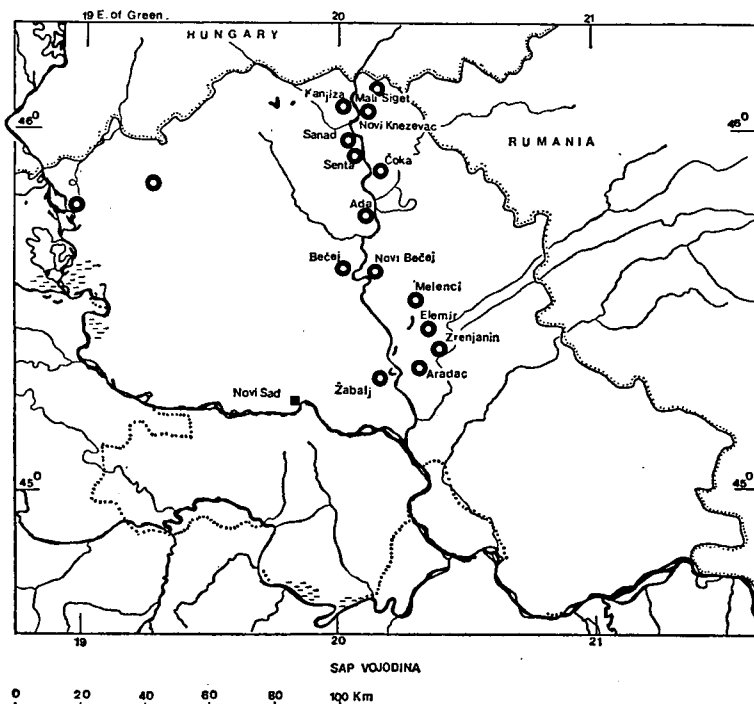


Fig. 1. Map of SAP Vojvodina with localities

Water level of the Tisa changes as it approaches the Danube. The first maximum in this area lasts almost three months — from April till June, and is caused by high water level of the Danube (BUKUROB 1977).

### Sampling method

When choosing localities a care was taken that breeding places in flooded areas along the Tisa and those in pools, lakes and swamps, that is the parts of the former course, should be included equally. The crescent depressions are more or less in the vicinity of the river course, usually having

freshwater and only a few having brackish water (Slano kopovo near Novi Bečej, Rusanda near Melenci and Okanj near Elemir).

Along the Tisa material was collected in the vicinity of Žabalj, Bečej, Ada, Senta, Sanad, Novi Kneževac and Kanjiža, while pools, lakes and swamps are near following places Mali Siget, Čoka, Novi Bečej, Elemir, Melenci, Zrenjanin, Aradac, Orlovat, Okanj, Bački Monoštor and Svetozar Miletić (Fig. 2).

The number of larvae and adults during the field work was established with method approved by WHO. Larvae were collected by means of net dia 25 cm, and adults by means of aspirator and hand net.

By use of standard methods the material was prepared, determined and is kept within the collections of the Institute of Biology in Novi Sad.

## Results and Discussion

Researches conducted during a four year period enabled us to collect numerous and various material (over 2000 samples of adults and about 1500 samples of larvae) and to investigate this area thoroughly.

In regard to the production of mosquito breeding places flooded areas along the Tisa are more important. Flooded areas along the embankment in the vicinity of Novi Kneževac, Ada, Senta and Sanad cause the appearance and development of numerous samples of species *Aedes vexans* MEIGEN, *Aedes cinereus* MEIGEN, *Aedes sticticus* MEIGEN and *Aedes rossicus* DOL., GORIC., MITROF. Depending on year, *Aedes vexans* is predominant with its 50—60% of the total number of collected samples, all over researched areas along the Tisa. The number of generations of this and other species developing on this type of locality directly depends on the number of floods of riverside zone where the eggs have been laid, water temperature and the proportion between the length of day and night. Usually there are two generations of these species per year that are most numerous at the end of May — beginning of June and in the middle of July. If there are more rainfalls during a year and more oscillations of water level polivoltine species give three or rarely four generations within the period April—September. Beside mentioned species found on the localities along the Tisa the following were recorded: *Aedes cantans* MEIGEN, *Culex pipiens* comp. LINNAEUS, *Culex modestus* FICALBI, *Culex territans* WALKER and *Anopheles maculipennis* comp. MEIGEN.

Species of genus *Culex* are also abundant in this area, specially in inhabited places and are represented with about 15% (14,75%) of total number of collected mosquitoes. They have two or three generations per year depending on the quantity of rainfalls and their breeding places can be found in the most various places with water. Adults of these species fly much longer than the representatives of genus *Aedes*. If days are warm during middle of October females, probably searching for winter shelters, can be found easily. Species *Aedes cantans* is rather small in number and was registered on only two localities along Tisa (Žabalj, Novi Kneževac). This is an early spring univoltine species.

Species of *Anopheles maculipennis* comp. can be found during the whole season. During our researches larvae were collected in most cases. Adults usually stayed in stables basements and apartments, the places we did not controll. ADAMOVIĆ (1975) in his detailed researches of the region of Potisje recorded the presence of species *Anopheles atroparvus* VAN THIEL (Melenci, Čoka, Martonoš, Sakule and Čenta), *Anopheles maculipennis* MEIGEN (Bečej, Melenci, Sakule and Opovo), *Anopheles messeae* FALLERONI (Bečej, Biserno Ostrvo, Žabalj and Perlez) and *Anopheles clavider* MEIGEN (Melenci). The most numerous species in all controlled places was

*Anopheles messeae*. The material was collected in stables of 12 inhabited places in Potisje from June to October 1974 and 1975.

The second group of mosquito breeding places are pools, lakes and swamps, the remnants of the former river course. Some of these breeding places have the production which can be compared with the production of flooded areas along Tisa. These are lakes Slano kopovo, Rusanda, Okanj and Carska bara.

As far as fauna is concerned these localities are more interesting as there are conditions for developing of a number of different species which, at the same time, belong to rather rare species in this region. Species *Aedes caspius* PALLAS, *Aedes dorsalis* MEIGEN and *Aedes flavescens* MÜLLER are predominant on salines and they are very numerous in June and at the beginning of July.

Early in spring univoltine species such as *Aedes rusticus* ROSSI, *Aedes cantans*, *Aedes excrucians* WALKER and *Aedes annulipes* were found in forest covered areas (Carska bara, Bački Monoštor and Svetožar Miletić). Larvae of these species were registered at the end of March — beginning of April when the water temperature is relatively low (+4 to +7 °C). The adults of these species are represented in the largest number in June, while single samples can be found even in August.

Species *Culiseta annulata* SCHRANK was recorded, during our investigation, only in surroundings of Apatin, ADAMOVIĆ, (1975) designates this species as one of the most frequent in Potisje. According to this data samples of this species were found in all controlled stables.

Species *Uranotaenia unguiculata* EDWARDS has been recorded in Vojvodina till now only in surroundings of Melenci and Elemir. In July 1982 two females and one male were caught with hand net near Melenci. The next discovery was at the end of September 1982 when larvae were collected near Okanj lake (Božićić, 1982).

Species *Mansonia richiardii* FICALBI was registered near Čoka, Melenci, Bački Monoštor, Novi Bečej, Senta and Svetožar Miletić. Single samples were caught on all localities except for surroundings of Novi Bečej and Svetožar Miletić where more

- Aedes (Aedes) rossicus* DOLB. GORIC. MITROF. 1930
- \* + *Aedes (Aedes) cinereus* MEIGEN. 1830
- ▲ \* + *Aedes (Aedimorphus) vexans* MEIGEN. 1830
- + *Aedes (Ochlerotatus) sticticus* MEIGEN. 1838
- + *Aedes (Ochlerotatus) cantans* MEIGEN. 1818
- Aedes (Ochlerotatus) rusticus* ROSSI. 1790
- \* *Aedes (Ochlerotatus) flavescens* MÜLLER. 1764
- ▲ \* *Aedes (Ochlerotatus) caspius* PALLAS. 1771
- ◆ *Aedes (Ochlerotatus) dorsalis* MEIGEN. 1830
- \* *Aedes (Ochlerotatus) excrucians* WALKER. 1856
- Aedes (Ochlerotatus) annulipes* MEIGEN. 1830
- Culex (Barraudius) modestus* FICALBI. 1889
- + *Culex (Culex) pipiens comp.* LINNAEUS. 1758
- \* *Culex (Neoculex) territans* WALKER. 1356
- Culiseta (Culiseta) annulata* SCHRANK. 1776
- + *Mansonia (Cognillietidia) richiardii* FICALBI. 1889
- Uranotaenia (Pseudoficalbia) unguiculata* EDWARDS. 1913
- *Aedes (Ochlerotatus) catphylla* DYAR. 1916
- *Anopheles (Anopheles) atroparvus* VAN THIEL. 1927
- *Anopheles (Anopheles) maculipennis* MEIGEN. 1818
- *Anopheles (Anopheles) messeae* FALLERONI. 1926
- *Anopheles (Anopheles) claviger* MEIGEN. 1804
- ◆ MALARIA \* TULAREMIA + LYMPHOCYTIC CHORIOMENINGITIS ▲ TAHYNA VIRUS ENCEPHALITIS

Fig. 2. List of mosquitoes species in Potisje

samples were found but hardly could be characterized as numerous. First adult samples appear at the end of June and are most numerous at the end of July.

On the whole territory of Vojvodina 31 species of mosquitoes have been registered till now. Genus *Anopheles* is represented with 6 species, genus *Aedes* with 15 and genus *Culex* with 4. Genus *Culiseta* is represented with 3 species and genera *Uranotaenia*, *Orthopodomyia* and *Mansonia* with one species each.

We are not of the opinion that this is the final number of present species, specially if we compare the results of these faunistical researches with the results obtained in Hungary (MIHALYI, 1941, 1945, 1961; MIHALYI et al 1963) a country with similar conditions for mosquitoes development.

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## Szúnyogfauna vizsgálatok (*Culicidae, Diptera*) a Tiszamentén

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### Kivonat

A Tisza árterülete, valamint a visszamaradt holtágai a szúnyogfejlődés tipikus biotópusai. A *Culicidae* család (*Diptera*) faunisztikai vizsgálatára az 1979—1982 időszakban került sor a nevezett térségben.

Az anyaggyűjtés 7 gyűjtőterületet ölelt föl a Tiszamentén (Zsabylya, Becse, Ada, Zenta, Szanád, Törökkanizsa és Kanizsa). A további 11 gyűjtőtérst a Mali Siget, Csóka, Törökbecse, Elemér, Melence, Zrenjanin, Aradac, Orlovát, Okanj, Bácsmonostor és Svetožar Miletić környékén elterülő félholdalakú depressziók, mocsarak, tószzerű Tisza-maradványok képezték. Egyesek, mint a Törökbecsei Sósokópó, valamint a Melencei- és Orlováti tavak, jelentősebb sómennyiséget tartalmaznak.

A föltüntetett kutatási térségből 18 szúnyogfaj jelenléte volt kimutatható: *Ae. vexans*, *Ae. sticticus*, *Ae. cinereus*, *Ae. rossicus*, *Ae. cantans*, *Ae. flavescens*, *Ae. caspius*, *Ae. dorsalis*, *Ae. excrucians*, *Ae. rusticus*, *Culiseta annulata*, *C. pipiens comp.*, *C. modes us*, *C. territans*, *An. maculipennis comp.*, *M. richiardii*, *U. unguiculata*, és *Ae. annulipes*.

# Исследование фауны комаров в окрестности потишье

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## Резюме

На протяжении 4-х летних исследований (1979—1982) на территории Поттишье нам удалось познакомиться с 18 видами комаров. Из модельных образцов 6 были пойманы по реке Тиса, II- в зоне берегов Тисы (старицах, берегах). Из приведенных 18 видов комаров по территориальному распределению 9 явилось характерными для самой реки Тисы, а 9 — для её заливной территории. С ранее описанными 5 видами в настоящее время на территории Поттишье встречается 23 вида комаров.

## Istraživanja faune komaraca (Diptera, Culicidae) u Potisju

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## Rezime

Plavne površine uz Tisu kao i ostaci nekadašnjeg toka ove ravničarske reke (mrtva Tisa) predstavljaju tipična legla ko naraca. Faunistička istraživanja familije *Culicidae* (*Diptera*) ovog područja obavljena su u sezoni 1979—1982. godine.

Materijal je prikupljan na sedam lokaliteta uz Tisu (Žabalj, Bečej, Ada, Senta, Sanad, Novi Kneževac i Kanjiža) i jedanest lokaliteta koja predstavljaju ostatke nekadašnje Tise a danas su najčešće polumesečaste depresije, jezera, ili močvare. Ovi lokaliteti nalaze se u neposrednoj blizini sledećih mesta: Mali Siget, Čoka, novi Bečej, Elemir, Melenci, Zrenjanin, Aradac, Orlovat, Okanj, Bački Monoštor i Svetožar Miletić. Pojedine od navedenih polumesečastih depresija karakterišu se izvesnim procentom soli u vodi. Prvenstveno to su jezera kod Novog Bečaja, Melenaca i Orlovata.

Na svim navedenim lokalitetima zabeleženo je 18 vrsta, štosu predhodnih 5 koje nismo zabeležili u toku našeg rada čini ukupno 23 vrste komaraca na području Potisja. To su sledeće vrste: *Aedes rossicus*, *Aedes cinereus*, *Aedes vexans*, *Aedes sticticus*, *Aedes cantans*, *Aedes rusticus*, *Aedes flavescens*, *Aedes caspius*, *Aedes dorsalis*, *Aedes excrucians*, *Aedes annulipes*, *Culex modestus*, *Culex pipiens comp.*, *Culex territans*, *Culiseta annulata*, *Mansonia richiardii*, *Uranotaenia unguiculata*, *Aedes cataphylla*, *Anopheles atroparvus*, *Anopheles maculipennis*, *Anopheles messeae*, *Anopheles claviger*.